CLAIMS

1. An antenna element, comprising:

a front plate that includes slots configured for wireless communication signal transfer;

a dielectric configured to regulate a cutoff wavelength of the antenna element;

a channel guide coupled to the front plate and configured to confine the dielectric in a position that aligns the dielectric with the slots in the front plate; and

a back plate coupled to the channel guide and configured to enclose the dielectric within the channel guide to form an enclosed dielectric channel.

2. An antenna element as recited in claim 1, wherein the dielectric is formed from a polystyrene material.

3. An antenna element as recited in claim 1, wherein the dielectric includes a center conductive section and one or more cross-sections.

4. An antenna element as recited in claim 1, wherein the dielectric includes a center conductive section and one or more cross-sections transverse to the center conductive section.

5. An antenna element as recited in claim 1, wherein:

the dielectric includes a center conductive section and one or more cross-sections perpendicular to the center conductive section;

the center conductive section extends lengthwise within the enclosed dielectric channel; and

the one or more cross-sections are spaced within the enclosed dielectric channel to align with the slots in the front plate.

6. An antenna element as recited in claim 1, wherein:

the dielectric includes a center conductive section and one or more cross-sections perpendicular to the center conductive section;

the center conductive section extends lengthwise within the enclosed dielectric channel between a first row of the slots and a second row of the slots; and

the one or more cross-sections are spaced within the enclosed dielectric channel to align with the slots in the front plate.

7. An antenna element as recited in claim 1, wherein the channel guide includes at least a first sidewall and a second sidewall, and wherein the first sidewall and the second sidewall are each configured to prevent communication signal interference.

8. An antenna element as recited in claim 1, wherein the front plate further includes the slots spaced apart a distance that is substantially equivalent to an antenna element wavelength divided by two.

9. An antenna element as recited in claim 1, wherein the front plate further includes a first row of one or more of the slots and a second row of one or more of the slots.

10. An antenna element as recited in claim 1, wherein the front plate further includes a first row of one or more of the slots and a second row of one or more of the slots, and wherein the slots in each of the first row and the second row are spaced apart a distance that is substantially equivalent to an antenna element wavelength divided by two.

11. An antenna element as recited in claim 1, wherein the front plate further includes a first row of one or more of the slots and a second row of one or more of the slots, and wherein the slots in the first row are offset from the slots in the second row.

12. An antenna element as recited in claim 1, wherein:

the front plate further includes a first row of one or more of the slots and a second row of one or more of the slots; and

the slots in the first row are offset from the slots in the second row in a direction parallel to the first row and a distance that is substantially a length of a slot.

13. An antenna element as recited in claim 1, wherein the slots in the front plate are substantially rectangular.

14. An antenna element as recited in claim 1, wherein the slots in the front plate are notched slots.

15. An antenna element as recited in claim 1, wherein the slots in the front plate are offset slots.

16. An antenna element as recited in claim 1, wherein the slots in the front plate are offset slots, and wherein an offset slot is substantially rectangular having an offset section formed about a transverse center of the offset slot.

17. An antenna element as recited in claim 1, further comprising a connection system configured to communicatively couple the antenna element to an antenna system component.

18. An antenna element as recited in claim 1, further comprising:

an RF connection system configured to communicatively couple the antenna element to an antenna system component; and

a fastener component configured to communicatively couple the dielectric to the RF connection system without an RF connector.

19. An antenna assembly comprising one or more antenna elements as recited in claim 1.

20. A waveguide enclosing a solid dielectric.

21. A waveguide enclosing a solid dielectric as recited in claim 20, wherein:

the solid dielectric includes a center conductive section and one or more cross-sections perpendicular to the center conductive section;

the center conductive section extends lengthwise within the enclosed waveguide; and

the one or more cross-sections are spaced within the enclosed waveguide to align with communication signal transfer slots in the enclosed waveguide.

22. A waveguide enclosing a solid dielectric as recited in claim 20, wherein the enclosed waveguide includes:

a front plate having communication signal transfer slots;

a channel guide coupled to the front plate and configured to confine the solid dielectric in a position that aligns the solid dielectric with the communication signal transfer slots; and

a back plate coupled to the channel guide to enclose the solid dielectric within the channel guide.

23. An antenna assembly comprising one or more waveguides enclosing a solid dielectric as recited in claim 20.

24. An antenna system, comprising:

an antenna assembly of one or more antenna elements, each antenna element including a solid dielectric enclosed in a conductive channel having slots configured for wireless communication signal transfer;

one or more antenna boards each configured to interface communication signals with the antenna assembly; and

a beam-forming network configured to set-up a phasing of the antenna assembly.

25. An antenna system as recited in claim 24, wherein:

the one or more antenna elements of the antenna assembly further include a first row of the slots and a second row of the slots;

the slots in each of the first row and the second row are spaced apart a distance that is substantially equivalent to an antenna element wavelength divided by two; and

the slots in the first row are offset from the slots in the second row in a direction parallel to the first row and a distance that is substantially a length of a slot.

26. An antenna system as recited in claim 24, wherein the one or more antenna elements of the antenna assembly include the slots that are substantially rectangular.

27. An antenna system as recited in claim 24, wherein the one or more antenna elements of the antenna assembly include the slots that are offset slots.

28. An antenna system as recited in claim 24, wherein the one or more antenna elements of the antenna assembly include the slots that are offset slots, and wherein an offset slot has an offset section formed about a transverse center of the offset slot.

29. An antenna system as recited in claim 24, further comprising one or more connection systems each corresponding to a different one of the one or more antenna elements, each connection system configured to communicatively couple a corresponding antenna element to an antenna board.

30. An antenna system as recited in claim 24, further comprising:

one or more RF connection systems each corresponding to a different one of the one or more antenna boards, each RF connection system configured to communicatively couple a corresponding antenna element to an antenna board; and

one or more fastener components each configured to communicatively couple the solid dielectric of the corresponding antenna element to the RF connection system without an RF connector.

31. A wireless communication system comprising one or more antenna systems as recited in claim 24.

32. A wireless communication system, comprising:

a communication network;

a server computing device configured to administrate the wireless communication system;

an antenna system communicatively coupled to the computing device via the communication network, the antenna system configured to transmit and receive wireless communication signals throughout a region with an antenna assembly having antenna elements that each include a solid dielectric enclosed in a conductive channel having slots configured for communication signal transfer.

33. A wireless communication system as recited in claim 32, further comprising one or more client devices configured to receive data from the server computing device, the data transmitted as the wireless communication signals with the antenna system.

34. A wireless communication system as recited in claim 32, further comprising one or more client devices each configured to communicate data to the server computing device, the data being communicated as the wireless communication signals via the antenna system.

35. A wireless communication system as recited in claim 32, further comprising:

a first client device configured to transmit and receive the wireless communication signals; and

a second client device configured to communicate data to the first client device, the data being communicated as the wireless communication signals via the antenna system.

36. A method, comprising:

forming a front plate with slots configured to wirelessly transfer communication signals;

forming a channel guide;

forming a back plate; and

attaching the front plate, the channel guide, and the back plate together to form a conductive channel that encloses a solid dielectric.

37. A method as recited in claim 36, further comprising forming the solid dielectric to regulate a cutoff wavelength of the conductive channel.

38. A method as recited in claim 36, further comprising forming the solid dielectric with a center conductive section and one or more transverse cross-sections.

39. A method as recited in claim 36, further comprising forming the solid dielectric with a center conductive section and one or more cross-sections perpendicular to the center conductive section.

40. A method as recited in claim 36, further comprising:

forming the solid dielectric with a center conductive section and one or more cross-sections perpendicular to the center conductive section; and

positioning the solid dielectric such that the center conductive section extends lengthwise within the conductive channel and the one or more cross-sections are spaced to align with the slots in the front plate.

41. A method as recited in claim 36, wherein forming the channel guide includes forming the channel guide with at least a first sidewall and a second sidewall, and wherein the first sidewall and the second sidewall are each configured to prevent communication signal interference with an adjacent conductive channel.

42. A method as recited in claim 36, wherein forming the front plate includes forming the front plate with a first row of one or more of the slots and a second row of one or more of the slots.

43. A method as recited in claim 36, wherein forming the front plate includes forming the front plate with a first row of one or more of the slots and a second row of one or more of the slots, and wherein the slots in the first row are offset from the slots in the second row.

44. A method as recited in claim 36, wherein forming the front plate includes forming the front plate with the slots that are substantially rectangular.

45. A method as recited in claim 36, wherein forming the front plate includes forming the front plate with the slots that are offset slots.

46. A method as recited in claim 36, wherein forming the front plate includes forming the front plate with the slots that are offset slots, and wherein each offset slot has an offset section formed about a transverse center of the offset slot.

47. A method as recited in claim 36, further comprising coupling the solid dielectric to an RF conductive trace of an RF connection system without using an RF connector.